WHAT IS CLAIMED IS:

1. A method of measuring an artefact using a machine on which a measuring probe is mounted for relative movement with respect to the artefact, said machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus, and at least one measuring device for measuring deflections of the stylus to provide one or more probe outputs which are indicative of the amount of deflection of the stylus from a rest position, the method being characterised by the steps of:

causing relative movement between the probe and artefact to bring the stylus into contact with the surface of an artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, during both the periods of contact and non contact between the stylus and the artefact;

providing a model of the probe and CMM outputs which models the outputs both during contact and non contact between the stylus and the artefact;

fitting the model to the data and thereby determining the values of the outputs of the measuring device or devices of the machine relating to the contact position at which the stylus contacts the artefact with zero contact force; and

combining said outputs of the measuring device or devices of the machine at said contact position with the probe deflection at the contact instant to establish the contact position at zero force.

2. A method according to claim 1 wherein the outputs of the measuring devices of the machine and the probe are recorded during one or both of the probes relative movement towards the artefact and away from the artefact.

3. A method according to claim 1 wherein the model comprises a break line.

4. A method according to claim 3 wherein the break line comprises a linear combination of two or more functions.

5. A method according to claim 4 wherein a first function comprises a line of zero gradient and a second function comprises a sloped line.

6. A method according to claim 1 wherein the value of the outputs of the machine when the stylus contacts the artefact with zero contact force are determined by an optimisation procedure.

7. A method according to claim 1 wherein deflections of the stylus provides at least two probe outputs relating to at least two probe axes and wherein the data from each probe output is used individually to determine a single contact position.

8. A method according to claim 1 wherein the machine has three measuring devices to measure the relative position of the probe in three orthogonal directions.

9. A method according to claim 1 wherein the probe has three measuring devices to measure the deflection

of the stylus in three orthogonal directions.

10. A method of measuring an artefact using a machine on which a measuring probe is mounted for relative movement with respect to the artefact, said machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus and at least one measuring device for measuring deflections of the stylus to provide two or more probe outputs which are indicative of the amount of deflection of the stylus from a rest position along at least two probe axes, the method including the steps of:

causing relative movement between the probe and artefact to bring the stylus into contact with the artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, in at least part of the period of contact between the stylus and the artefact;

from said outputs of the machine and of the probe, determining the values of the outputs of the machine relating to the contact position when the stylus contacts the artefact with zero contact force;

wherein the data from each probe output is used individually to determine a single contact position.

11. A method of measuring an artefact according to claim 10 wherein an optimisation procedure is used to determine the single contact position from each individual probe output.

12. A method of measuring an artefact using a machine on which a measuring probe is mounted for relative movement with respect to the artefact, said machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus and at least one measuring device for measuring deflections of the stylus to provide two or more probe outputs which are indicative of the amount of deflection of the stylus from a rest position, the method including the steps of:

causing relative movement between the probe and artefact to bring the stylus into contact with the artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, in at least part of the period of contact between the stylus and the artefact, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe both for relative movement between the probe and artefact towards and away from one another, determining the values of the outputs of the machine relating to the contact position when the stylus contacts the artefact with zero contact force.

13. A method of measuring an artefact using a machine on which a measuring probe is mounted for relative movement with respect to the artefact, said machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus and at

least one measuring device for measuring deflections of the stylus to provide one or more probe outputs which are indicative of the amount of deflection of the stylus from a rest position, the method including the steps of:

causing relative movement between the probe and the artefact to bring the stylus into contact with the artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, in at least part of the period of contact between the stylus and the artefact, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe, determining the values of the outputs of the machine relating to the contact position when the stylus contacts the artefact with zero contact force, both for relative movement between the probe and artefact towards and away from one another, thereby determining two apparent contact positions;

and wherein the true contact position is determined by combining the two apparent contact positions.

14. A method according to claim 13 wherein the combination of the two apparent contact positions comprises taking an average of the two apparent contact positions.

15. A method according to claim 14 wherein the average is weighted by the relative speeds of the machine during the relative movement between the probe and

artefact in each direction.

16. A method according to claim 13 wherein the speeds of the machine during the relative movement in between the probe and artefact in each direction is the same.

17. A method of measuring an artefact using a machine on which a measuring probe is mounted for relative movement with respect to the artefact, said machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having at least one measuring device for providing one or more probe outputs indicative of the distance of the probe form a surface, the method including the steps of:

causing relative movement between the probe and artefact;

recording the outputs of the machine and of the probe at a plurality of instants, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe both for relative movement between the probe and the artefact towards and away from one another, determining the surface positions of a surface of the artefact.

18. A method of measuring an artefact using a machine on which a measuring probe is mounted for relative movement with respect to the artefact, said machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having at least one measuring device for providing one or more probe outputs indicative of the distance of the probe from a surface, the method

including the steps of:

causing relative movement between the probe and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe, determining two apparent surface positions of a surface of the artefact, the two apparent surface positions relating to relative movement between the probe and artefact towards and away from one another respectively;

and wherein the true surface position is determined by combining the two apparent surface positions.

19. A method according to claim 18 wherein the combination of the two apparent surface positions comprises taking an average of the two apparent surface positions.

20. A method according to claim 19 wherein the average is weighted by the relative speeds of the machine during the relative movement between the probe and artefact in each direction.

21. A method according to claim 18 wherein the probe is a non contact probe.

22. A computer program for use with apparatus for measuring the dimensions of an artefact, the apparatus comprising a measuring probe mounted on a machine for relative movement with respect to the artefact, the

machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus, and at least one measuring device for measuring deflections of the stylus to provide one or more probe outputs which are indicative of the amount of deflection of the stylus from a rest position, the computer program causing the following steps:

producing relative movement between the probe and artefact to bring the stylus into contact with the surface of an artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, during both the periods of contact and non contact between the stylus and the artefact;

providing a model of the probe and CMM outputs which models the outputs both during contact and non contact between the stylus and the artefact;

fitting the model to the data and thereby determining the values of the outputs of the measuring device or devices of the machine relating to the contact position at which the stylus contacts the artefact with zero contact force; and

combining said outputs of the measuring device or devices of the machine at said contact position with the probe deflection at the contact instant to establish the contact position at zero force.

23. A computer program according to claim 22 wherein the outputs of the measuring devices of the machine and the probe are recorded during one or both of the probes relative movement towards the artefact and away from

the artefact.

24. A computer program according to claim 22 wherein the model comprises a break line.

25. A computer program according to claim 24 wherein the break line comprises a linear combination of two or more functions.

26. A computer program according to claim 25 wherein a first function comprises a line of zero gradient and a second function comprises a sloped line.

27. A computer program according to claim 22 wherein the value of the outputs of the machine when the stylus contacts the artefact with zero contact force are determined by an optimisation procedure.

28. A computer program according to claim 22 wherein deflections of the stylus provides at least two probe outputs relating to at least two probe axes and wherein the data from each probe output is used individually to determine a single contact position.

29. A computer program for use with apparatus for measuring the dimensions of an artefact, the apparatus comprising a measuring probe mounted on a machine for relative movement with respect to the artefact, the machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus and at least one measuring device for measuring deflections of the stylus to provide two or more probe outputs which are indicative of the amount of deflection of the

stylus from a rest position along at least two probe axes the computer program causing the following steps:

producing relative movement between the probe and artefact to bring the stylus into contact with the artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, in at least part of the period of contact between the stylus and the artefact;

from said outputs of the machine and of the probe, determining the values of the outputs of the machine relating to the contact position when the stylus contacts the artefact with zero contact force;

wherein the data from each probe output is used individually to determine a single contact position.

30. A computer program according to claim 29 wherein an optimisation procedure is used to determine the single contact position from each individual probe output.

31. A computer program for use with apparatus for measuring the dimensions of an artefact, the apparatus comprising a measuring probe mounted on the machine for relative movement with respect to the artefact, the machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus and at least one measuring device for measuring deflections of the stylus to provide two or more probe outputs which are indicative of the amount of deflection of the stylus from a rest position, the computer program

causing the following steps of:

producing relative movement between the probe and artefact to bring the stylus into contact with the artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, in at least part of the period of contact between the stylus and the artefact, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe determining the values of the outputs of the machine relating to the contact position when the stylus contacts the artefact with zero contact force, both for relative movement between the probe and artefact towards and away from one another, thereby determining two apparatus contact positions;

and wherein the true contact position is determined by combining the two apparent contact positions.

32. A computer program according to claim 31 wherein the combination of the two apparent contact positions comprises taking an average of the two apparent contact positions.

33. A computer program according to claim 32 wherein the average is weighted by the relative speeds of the machine during the relative movement between the probe and artefact in each direction.

34. A computer program according to claim 31 wherein the speeds of the machine during the relative movement

in between the probe and artefact in each direction is the same.

35. A computer program for use with apparatus for measuring the dimensions of an artefact, the apparatus comprising a measuring probe mounted on a machine for relative movement with respect to the artefact, the machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having one measuring device for providing one or more probe outputs indicating of the distance of the probe from a surface, the computer program causing the following steps:

producing relative movement between the probe and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe, determining two apparent surface positions of a surface of the artefact, the two apparent surface positions relating to relative movement between the probe and artefact towards and away from one another, respectively;

and wherein the true surface position is determined by combining the two apparent surface positions.

36. A computer program according to claim 35 wherein the combination of the two apparent surface positions comprises taking an average of the two apparent surface positions.

37. A computer program according to claim 36 wherein

the average is weighted by the relative speeds of the machine during the relative movement between the probe and artefact in each direction.

38. A computer program according to claim 35 wherein the probe is a non contact probe.

39. A computer program for use with apparatus for measuring the dimensions of an artefact, the apparatus comprising a measuring probe mounted on the machine for relative movement with respect to the artefact, the machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having a deflectable stylus and at least one measuring device for measuring deflections of the stylus to provide two or more probe outputs which are indicative of the amount of deflection of the stylus from a rest position, the computer program causing the following steps of:

producing relative movement between the probe and artefact to bring the stylus into contact with the artefact and continuing said movement for a limited distance after initial contact has been made between the stylus and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, in at least part of the period of contact between the stylus and the artefact, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe, both for relative movement between the probe and the artefact towards and away from one another, determining the values of the outputs of the machine relating to the contact position when the stylus contacts the

artefact with zero contact force.

40. A computer program for use with apparatus for measuring the dimensions of an artefact, the apparatus comprising a measuring probe mounted on a machine for relative movement with respect to the artefact, the machine having at least one measuring device for providing an output indicative of the relative position of the probe, the probe having one measuring device for providing one or more probe outputs indicating of the distance of the probe from a surface, the computer program causing the following steps:

producing relative movement between the probe and the artefact;

recording the outputs of the machine and of the probe at a plurality of instants, both for relative movement between the probe and artefact towards and away from one another;

from said outputs of the machine and of the probe, both for relative movement between the probe and the artefact towards and away from one another, determining the surface position of a surface of the artefact.